Chapter 3

Air Quality

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3.1 Primary Issues

Sand and gravel mining, by its nature, involves moving large amounts of material. Moving and disturbing such material can generate dust, especially under dry conditions. Many people are concerned about this dust drifting on and into their homes.

The primary issue analyzed in this section is:

- Would fugitive dust resulting from the project exceed regulatory standards at the property line or at nearby residential locations?

Issues associated with the release of arsenic are discussed in Chapter 10.

3.2 Affected Environment

3.2.1 Regulatory Overview

Three agencies have jurisdiction over air quality in the project area: the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology, and the Puget Sound Clean Air Agency. Although EPA and Ecology have an oversight role, PSCAA is the primary regulatory agency and has primary permitting responsibility related to air quality issues. PSCAA has adopted ambient air quality standards as shown in Table 3-1.

Some of the “criteria” pollutants listed in Table 3-1 are subject to two types of standards. “Primary” standards are designed to protect human health with an adequate margin of safety, while “secondary” standards are established to protect the public welfare from any known or anticipated effects associated with these pollutants, such as soiling, corrosion, or damage to vegetation. It is generally accepted that if the ambient concentrations are less than the PSCAA limits listed in Table 3-1, then no significant air quality impacts have occurred.

Particulate matter (dust) less than or equal to 10 micrometers (µm) in diameter (PM10) is the focus of the analysis prepared for mining operations on the site. Other pollutants listed in Table 3-1 (sulfur dioxide, carbon monoxide, etc.) would be emitted at relatively low rates from the tailpipes of trucks and other operating equipment (e.g., bulldozers) and are expected to have minimal impacts on ambient air quality. Therefore, they are not addressed in detail in this EIS.

PM10 is important in terms of potential health impacts because particles in this size range can be inhaled deeply into the lungs. PM10 is generated by industrial activities and operations; fuel combustion sources, such as residential wood-burning stoves, motor vehicle engines, and tires, and other sources. In July 1997, the EPA revised particulate matter standards to include particulate matter less than or equal to 2.5 µm in diameter (PM2.5) because particulates at this size were the greatest concern to health (EPA 1997). However, almost all of the particulate matter generated by sand and gravel operations is larger than the fine particles considered PM2.5, and most of the particulate matter emitted is greater in diameter than the coarser particles (PM10). Therefore, only PM10 is addressed in detail.

3.2.2 Existing Air Quality

Ecology and PSCAA maintain a network of air quality monitoring stations throughout the Puget Sound area. In general, monitoring stations are located near where air quality problems are expected to occur, often near urban areas or close to specific large air pollution sources. A limited number of monitoring stations are located in more remote areas to provide an indication of regional or background air pollution levels.

There are no significant sources of PM10 near the project site. Because of the rural nature of the site, background or ambient PM10 concentrations are likely to be less than those reported at nearby urban monitoring stations. Since none of the existing monitoring stations is near the site, the locations of the nearest monitors were evaluated to determine which locations would best represent conditions at the project site. The nearest monitoring stations are located at:

- Kent (James Street and Central Avenue),
- Northeast Tacoma (5225 Tower Drive Northeast),

- Seattle, South Park (723 South Concord Street),
- Meadowdale (7252 Blackbird Drive Northeast), and
- Poulsbo (6th Avenue Northeast and Fjord Drive).

Of these monitoring stations, Northeast Tacoma, Meadowdale, and Poulsbo are most comparable to the rural environment of Maury Island. The most recent PM10 data for these three stations are:

- Northeast Tacoma: 46 micrograms per cubic meter ($\mu g/m^3$) (second-highest 24-hour average),
- Meadowdale: 48 $\mu g/m^3$ (second-highest 24-hour average), and
- Poulsbo: 35 $\mu g/m^3$ (second-highest 24-hour average) (PSCAA 1997).

Based on these data, the highest (and therefore worst-case) regional PM10 level (48 $\mu g/m^3$) was assumed for the background PM10 concentration at the project site. Because of the rural nature of the project site, and the lack of significant PM10 sources in the vicinity, actual background PM10 concentrations are likely much lower than those used in this analysis.

3.3 Impacts

3.3.1 Would fugitive dust resulting from the project exceed regulatory standards at the property line or at nearby residential locations?

3.3.1.1 Proposed Action

In order to describe potential dust impacts related to mining under the Proposed Action or alternatives, it is necessary first to explain features of the proposal that relate to dust impacts, and the factors that were considered in performing air quality computer modeling for the project. These are discussed in the following sections. The section titled “PM10 Modeling Results”, following the introductory discussion of methods, discusses the specific dust impacts predicted for the Proposed Action. In general the project is not anticipated to generate significant levels of the type of dust (i.e., very small particles) that creates potential health impacts. As mentioned earlier, the potential for the project to release airborne arsenic is discussed in Chapter 10.

Features of the Proposed Action Related to Air Quality Impacts. Under the Proposed Action, sand and gravel extraction could approach 7.5 million tons per year, with nearly all of the material being sent to off-island markets via barges. The project site would provide a relatively uniform product (sand and gravel) that would simplify how the material is extracted and processed. Essentially only a few product specifications would be produced at the site, compared to other sites that produce a wide range of products (e.g., different sizes of gravel, mixtures, etc.) that require complicated sorting, crushing, processing, and mixing equipment.

Equipment used for the project would include wheeled loaders and bulldozers. Wheeled loaders would be used to load materials onto trucks for on-island distribution. A maximum of 20 trucks per day could be required at times to meet on-island demand. Additional trucking would be considered a major project modification, and subject to SEPA review. Trucking would be a very small component of the overall project, limited to on-island markets.

Bulldozers would be used to excavate materials. Bulldozers would work from the top of the slope, pushing materials down the slope to a collection point where it would be conveyed to a feeder, which delivers materials to the conveyor system for transport to the barges.

Other than the presence of a portable crushing plant at the site for 1 to 2 months every 3 or 4 years (see Chapter 2), there would be no ancillary activities that are typically associated with mining operations (e.g., rock crushers, concrete or asphalt batching plants, wood or concrete recycling operations, etc.). There would be no lifting and dropping of mined materials (except for loading of individual trucks), nor would there be batch dropping of mined materials into the conveyor system.

Emissions Inventory. Operational emission rates for the air quality modeling were based on a worst-case annual extraction rate of 7.5 million tons of material with equipment operating 16 hours per day (Monday through Friday) and 9 hours per day on Saturdays. The emission rates and the ambient air quality modeling were based on the production rates shown in Table 3-2.

AP-42, EPA's Compilation of Air Pollutant Emissions, was used to provide the emission equations for each emission source associated with the project. Based on information provided in

Chapter 2 of this EIS, there would be two primary emission sources associated with the project: (1) line source emissions associated with trucks traveling on unpaved haul roads; and (2) area source emissions associated with bulldozers pushing material into the feeder/conveyor system. Worst-case annual PM10 emissions associated with the Proposed Action would be approximately 12 tons per year, as shown in Table 3-3.

Model Selection. There are a number of air quality models that can be used for evaluating fugitive dust impacts. The selection of a model for a particular application is determined by several factors, including the nature of the emission source, the environmental setting in which the project would occur, pollutants being evaluated, and the data available to conduct the analysis. Based on conversations with PSCAA, EPA, and Ecology, the Fugitive Dust Model (FDM) was selected for this analysis.

Three types of information are required to model air quality impacts with the FDM:

- emission source information, including emission rates and locations;
- meteorological data depicting atmospheric conditions in the vicinity of the project site; and
- receptor data, including locations at which concentrations are to be computed.

Emission Information. For this analysis, emission sources are grouped into two general categories:

- sand and gravel mining areas (area sources), and
- haul roads (line sources) used by trucks traveling on the site.

Figure 3-1 shows the locations of the area sources along with the project site boundaries for three scenarios modeled for this analysis. The three scenarios selected for the area sources reflect phases of the project operation when mining activities would be closest to the project boundary and would have the greatest potential for offsite impacts.

Meteorological Information. Meteorological data are used in the FDM to determine how the air transports and disperses emissions from the project. Under ideal conditions, onsite data are collected and used in the analysis. However, no onsite data are available for the proposed project and, because of the complicated topographical features surrounding the site, it was felt that a "generic" regional data set would not be appropriate or representative of conditions at the site.

For this project, Jones & Stokes developed a meteorological data set that consisted of all possible wind speed, direction, and stability class combinations, except that nighttime speed/stability classifications representing the most stable environmental conditions (Classes E and F) were not included because mining operations would not occur at night. Each of the remaining speed/stability combinations was modeled for each of 36 wind directions in 10-degree increments. Using this meteorological data set ensured that the worst-case combination of wind speed, direction, and stability would be reflected in the model results (i.e., the worst-case impacts associated with the project would be determined). Using this approach, a total of 1,084 hours of meteorological data were used in the modeling.

Receptor Information. Receptors are the locations at which PM10 concentrations are estimated. Two types of receptor locations were used for this project: project boundary locations and nearby offsite residential locations. A total of 298 receptor locations were modeled in the analysis.

PM10 Modeling Results. The Fugitive Dust Model was used to estimate maximum (i.e., worst-case) 24-hour PM10 concentrations at three locations representative of when mining activities would be closest to the property lines and nearest the offsite residential receptors (Figure 3-1). These three locations are discussed below as Scenarios 1, 2, and 3. As described below, under all three scenarios, the worst-case 24-hour PM10 concentrations would be less than the regulatory standard.

Scenario 1. Under Scenario 1, emissions were modeled based on mining activities in the northeastern corner of the project site. The nearest receptors to this portion of the project site are individual residences of the Gold Beach community, approximately 600 to 1,000 feet east of the site. Table 3-4 shows the maximum modeled 24-hour average PM10 concentrations at the property line and at nearby residential receptors.

Modeling indicated that the maximum impact under this scenario would occur near the main access road to the project site off of Southwest 260th Street. The 70 $\mu g/m^3$ project contribution plus the assumed 48 $\mu g/m^3$ background concentration would result in a total PM10 concentration of 118 $\mu g/m^3$ at this location, which would be below the 150 $\mu g/m^3$ standard. Near the Gold Beach residential receptors, modeled PM10 concentrations ranged from 112 to 116 μg/m^3 (including 48 μg/m^3 background concentration), also below the standard.

Scenario 2. Under Scenario 2, emissions were modeled based on mining activities in the west-central portion of the project site (Figure 3-1). The nearest residential receptors to this location are a single residence located approximately 200 feet west of the project site and residences near the southern property line.

Modeling under this scenario indicated that the maximum impact would occur at the western property line. The maximum modeled PM10 concentration at this location would be 118 μg/m^3 (including 48 μg/m^3 background concentration), the same as modeled under Scenario 1. This would also be below the 150 μg/m^3 standard. At the nearest residential locations, modeled PM10 concentrations would range from 111 to 112 μg/m^3.

Scenario 3. Under Scenario 3, emissions were modeled based on mining activities in the southwestern corner of the project site (Figure 3-1). As with Scenario 2, the nearest residential receptors to this location are a single residence located approximately 200 feet west of the project site and residences near the southern property line.

Modeling under this scenario indicated that the maximum impact would occur near the western property line. The maximum modeled PM10 concentration at this location would be 119 μg/m^3 (including 48 μg/m^3 background concentration), which would be below the 150 μg/m^3 standard. At the nearest residential locations, modeled PM10 concentrations would range from 108 to 115 μg/m^3.

Annual PM10 Concentrations. Annual average PM10 concentrations are expected to be lower than the modeled 24-hour average concentrations shown in Table 3-4 for several reasons. First, rainfall (which was not included in the emission rate estimates developed for the FDM modeling scenarios) would control some dust, reducing the overall volume of fugitive dust leaving the site. Second, average winds would provide better downwind dispersion of fugitive dust than is indicated by modeling of the worst-case 24-hour period. Because the modeled maximum 24-hour concentrations at all locations are below the regulatory standard, it is assumed that the maximum annual-average concentrations would also be less than the corresponding standard.

In addition, according to the EPA guidance document, Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (EPA 1992), annual PM10 concentrations can be conservatively estimated by multiplying 1-hour modeled PM10 concentrations by 0.1. For this analysis, the highest modeled 1-hour PM10 concentration was 180 $\mu g/m^3$, which results in an annual PM10 concentration of 18 $\mu g/m^3$. This agrees very well with the annual PM10 concentration as measured at the Kitsap County (Meadowdale) monitoring station (17 $\mu g/m^3$), and is well below the regulatory standard (Table 3-1).

3.3.1.2 Alternatives 1 and 2

The emission rates for Alternatives 1 and 2 were estimated by multiplying the emission rate for the Proposed Action by the ratio of the production rates for the selected alternative vs. the Proposed Action. The estimated emission rates for Alternatives 1 and 2 are shown in Table 3-3.

The fugitive dust emission rates for Alternatives 1 and 2 are less than the Proposed Action, because the daily production rate and the annual production rates would be limited by the number of loaded barges that could leave the site. Because the emission rates for each of the individual sources would be lower, it is reasonable to assume that the impacts would be lower than those modeled for the Proposed Action. Worst-case modeled PM10 concentrations for Alternatives 1 and 2, shown in Table 3-4, are all below the regulatory standards.

3.3.1.3 No-Action

Under the No-Action Alternative, mining activities at the project site would continue as they have for about the last 20 years, with annual production of approximately 20,000 tons. At these low levels of extraction, very small amounts of fugitive dust are created, and therefore air quality impacts would be minimal.

3.4 Adverse Impacts and Mitigation

3.4.1 Significance Criteria

King County considers the following as indicators of significance for air quality impacts under SEPA:

- violating federal, state, or local ambient air quality standards (Table 3-1);
- causing or contributing to a new violation of the National Ambient Air Quality Standards;
- increasing the frequency or severity of an existing violation;
- delaying the timely attainment of a standard; or
- exposing people to irritating or harmful airborne materials.

3.4.2 Measures Already Proposed by the Applicant or Required by Regulation

a. Notice of Construction Permit. Existing regulations, under the jurisdiction of the PSCAA, adequately mitigate impacts. The PSCAA would require the Applicant to obtain a "Notice of Construction" permit, a major goal of which is to identify air pollution controls at the site. The Agency would require the Applicant to apply Best Available Control Technology (BACT) to reduce air emissions from the site.

   PSCAA considers visible dust plumes leaving the site as the threshold for violation and subsequent agency action. Thus, prior to issuing the required permit, Agency staff would determine if the control technologies would likely prevent visible dust plumes from being carried past the property line. King County has determined, as part of the SEPA analysis, that proposed control measures, together with additional monitoring, adequately mitigate this impact.

   Once the mine is in operation, Agency staff would inspect the site at regular intervals, or upon the receipt of complaints. If visible dust plumes were observed leaving the site, the Agency would issue a Notice of Violation that could result in a fine and possible shutdown of the project until resolution of the problem.

b. Dust Control Plan. Keeping fine materials moist is the most effective way to minimize dust. Such measures are routinely applied for similar projects, and they would be incorporated into the required dust control plan under the authority of Sections 9.15 and 9.20 of the PSCAA Regulation 1. These regulations require the use of BACT to achieve the goal of "no visible dust" leaving the site. The following measures would likely be incorporated into a dust control plan for the project:

- A relatively high moisture content would be maintained in mined materials to minimize emissions. A water-spray truck would be maintained onsite during operating hours to wet exposed fine, dry materials to control any increases in dust generation from operation of bulldozers or trucks on the site. Water for dust control would be purchased and trucked onto the site. Water trucks hold about 5,000 gallons, and during dry conditions, the operation would use about two truckloads per day.

- A 50-foot wide vegetated buffer would be maintained around the site's perimeter as required by King County.

- Reclaimed areas would be permanently stabilized by hydroseeding or other procedures, according to the reclamation performance standards, as soon as mining is completed. Chapter 10 provides additional dust control measures recommended to address concerns regarding arsenic, as well as a dust monitoring plan proposed by the Applicant.

c. New Source Performance Standards. In addition to PSCAA regulations, the portable crushing plant, if it were to operate at a capacity greater than 150 tons per hour, would be subject to federal New Source Performance Standards (40 CFR 60 - Subpart OOO). The standards define explicit limits for dust emitted from stacks, transfer points, crushers, and building vents, and they require source tests and record keeping.

3.4.3 Remaining Adverse Impacts and Additional Measures

3.4.3.1 Air Impact 1 – Possible Impact Due to Inadequate Monitoring/Enforcement

While dust control is technically simple, the real challenge in ensuring compliance is in persistent and diligent monitoring and enforcement, as well as in education of people working at the site.

King County and PSCAA are responsible for enforcement, but typically such enforcement is triggered by citizen complaints. This often is sufficient, but requires an adverse impact (assuming a valid complaint) to trigger a response.

3.4.3.2 Air Mitigation 1

Include periodic inspection and discussion with site operators as part of an environmental monitoring and reporting plan for the project.

Relevant considerations for specific timing and frequency include:

1. Inspections and discussions with staff should be more frequent at project start-up, including start-up after periods of little or no mining.

2. Inspections should be timed during prolonged dry weather, when the potential for violation is greatest.

3. Frequent violations should trigger more regular inspections.

3.4.3.3 Regulatory/Policy Basis for Condition

Per the operation standards set forth in KCC Chapter 21A.22:

dust and smoke produced by extractive operations must not substantially increase the existing levels of suspended particulates at the perimeter of the site and must be controlled by watering of the site and equipment or other methods specified by the County.

3.5 Cumulative Impacts

With appropriate mitigation, the project would not significantly affect air quality, even when considered collectively with other air pollution sources from ongoing and reasonably expected activities.

3.6 Significant Unavoidable Adverse Impacts

None likely with existing laws clearly addressing potential impacts, as reinforced through additional monitoring and reporting. The project would be within air quality standards. Dust control measures are economically and technically feasible, as demonstrated in many major construction projects permitted in the region. Additional buffers would address concerns of adjacent landowners. Limits would be enforced through monitoring.

3.7 Citations

EPA. See "U.S. Environmental Protection Agency".

PSCAA. See "Puget Sound Clean Air Agency".

Puget Sound Clean Air Agency. 1997. Air quality summary reports, 1997 data summary. Obtained from the Internet at www.pscleanair.org/airqual.htm.

U.S. Environmental Protection Agency. 1992. Screening procedures for estimating the air quality impact of stationary sources, revised. Office of Air Quality Planning and Standards.

U.S. Environmental Protection Agency. 1997. Compilation of air pollutant emission factors. 5th edition and supplements. Office of Air Quality Planning and Standards.

Washington State Department of Ecology. 1999. 1997 air quality data summary. Air Quality Program.

Table 3-1. Ambient Air Quality Standards

Pollutant	National Primary	National Secondary	Washington State
Total Suspended Particulates			
Annual Geometric Mean	no standard	no standard	60 $\mu g/m^3$
24-Hour Average	no standard	no standard	150 $\mu g/m^3$
Lead (Pb)			
Quarterly Average	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	no standard
Particulates			
PM_{10}			
Annual Arithmetic Mean	50 $\mu g/m^3$	50 $\mu g/m^3$	50 $\mu g/m^3$
24-Hour Average	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
$PM_{2.5}$			
Annual Arithmetic Mean	15 $\mu g/m^3$	15 $\mu g/m^3$	no standard
24-Hour Average	65 $\mu g/m^3$	65 $\mu g/m^3$	no standard
Sulfur Dioxide (SO_2)			
Annual Average	0.03 ppm	no standard	0.02 ppm
24-Hour Average	0.14 ppm	no standard	0.10 ppm
3-Hour Average	no standard	0.50 ppm	no standard
1-Hour Average	no standard	no standard	0.40 ppm[a]
Carbon Monoxide (CO)[b]			
8-Hour Average	9 ppm	9 ppm	9 ppm
1-Hour Average	35 ppm	35 ppm	35 ppm
Ozone (O_3)[b]			
1-Hour Average[c]	0.12 ppm	0.12 ppm	0.12 ppm
8-Hour Average	0.08 ppm	0.08 ppm	no standard
Nitrogen Dioxide (NO_2)			
Annual Average	0.053 ppm	0.053 ppm	0.05 ppm

Notes:

[a] 0.25 not to be exceeded more than two times in any 7 consecutive days.

[b] Primary standards are listed in this table as they appear in the federal regulations; ambient concentrations are rounded using the next higher decimal place to determine whether a standard has been exceeded. The data in this report are shown with these unrounded numbers.

[c] Not to be exceeded on more than 1.0 days per calendar year as determined under the conditions indicated in Chapter 173-475 WAC.

ppm = parts per million

$\mu g/m^3$ = micrograms per cubic meter

Annual standards never to be exceeded, short-term standards not to be exceeded more than once per year unless noted.

Source: Washington State Department of Ecology 1999.

Table 3-2. Production Rates Used for Emission Calculations

	Maximum Daily Capacity (tpd)	*Maximum Annual Capacity (tpy)*
Proposed Action	40,000	7.5 million
Alternative 1	20,000 (weekdays) 10,000 (Saturdays)	5.72 million
Alternative 2	10,000	3.12 million

Table 3-3. Peak Annual PM10 Emission Rates Used to Model Potential Impacts

	Proposed Action		*Alternative 1*		*Alternative 2*	
Activity	***Lbs/day***	***(tons/yr)***	***lbs/day***	***(tons/yr)***	***lbs/day***	***(tons/yr)***
Haul Roads	48.9	7.6	36.7	5.7	12.2	1.9
Bulldozer Operations	28.2	4.4	21.2	3.3	7.1	1.1
Totals	77.1	12.0	57.9	9.0	19.3	3.0

Table 3-4. Maximum Modeled PM10 Concentrations (24-Hour Averages)

		*Maximum PM10 Concentrations**		
Alternatives	***Ambient AQ Standard ($\mu g/m^3$)***	***At Property Line***	***At Nearest Residences***	***Impact***
Proposed Action				
Scenario 1	150	118	112-116	no
Scenario 2	150	118	111-112	no
Scenario 3	150	119	108-115	no
Alternative 1	150	99	87-94	no
Alternative 2	150	83	77-80	no

* Includes 48 $\mu g/m^3$ background concentration.